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Vista IP Law Group LLP
1885 Lundy Avenue Suite 108
San Jose, CA 95131

EXAMINER	
ANDREWS, LEON T	
ART UNIT	PAPER NUMBER
2462	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/687,784	SINGH ET AL.	
	Examiner	Art Unit	
	LEON ANDREWS	2462	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 January 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,6-9,21,23-25,27 and 28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6-9,21,23-25,27 and 28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. **Claims 1-2, 4, 6-9, 21, 23-25 and 27-28** are being rejected under 35 U.S.C. 103(a) by Wong (Pub. No.: 2004/0264464 A1 using Provisional application No.: 60/482,759) in view of Tang et al. (Patent No.: US 6,553,028 B1).

Regarding Claim 1, Wong discloses a multicast packet duplication system for multicast packets (Internet Protocol Multicast (IPMC) packet duplication covers tables required to implement the MMU and egress module, page 3, lines 2-4) containing at least multicast address data (multicast packet is replaced with source MAC address, page 3, lines 14-15), comprising:
an input port (Block Diagram, CPI ingress bus, page STN-2) configured to receive a packet (IPMC packet, page 5, line 21);
a pointer table (ECMP Support, LPM table, page STN-7) having a width comprising a plurality of entries (ECMP Support, LPM table, page STN-7; ECMP Dest_Ip, steps 2 and 3, LPM table with ip addresses, page STN-8) coupled to a linked-list table (ECMP Support, L3 table, page STN-7; steps 6 and 7, L3_table_index, index points to entry of 8 entries in the L3 table); and
a plurality of output ports (Fig. 2, multicast packet generated and routed to RCVs 204-210 by way of router 250, column 8, lines 64-65; ports of the egress VLAN that receive the frame, column 14, lines 30-31) configured to output the packet, wherein:
a number of duplications of the packet for each of the plurality of output ports is controlled by descriptors arranged in a linked-list table indexed by a hashing function (replication engine performs replication operations using information which includes multicast expansion table

(MET) pointer and local target logic (LTL) index (descriptor) where the LTL index enables the replication engine to perform multicast packet replication, rewrites the frames (hashing) and destined to (output) ports on VLAN other than the ingress VLAN, column 14, lines 4-15, where each multicast entry accessed by IP source address, IP destination address and VLAN ID are hashed using a hash algorithm and the LTL index accesses an entry of the forwarding table using the VLAN ID, columns 12, 13, lines 59-67, 1-2) applied to said multicast address data (packet is replicated and forwarded and is the index into the IP multicast VLAN ID table, the IP recalculation and SA of the packet replaced with the IP multicast address, the packet is routed on to the outgoing VLAN, Replication Flow, page STN-48, lines 1-17);

wherein an encoding format (replication for the frame, column 14, lines 42-43) of the descriptors include at least one of:

a contiguous range encoding that includes a starting indicator and an ending indicator (replication process for each outgoing VLAN starts from the table pointer 750 (starting indicator) until an entry having an asserted control bit (ending indicator) specifies the termination of the replication for the frame, column 14, lines 37-43); or

a non-contiguous range encoding that includes a most significant bit (MSB) portion of an indicator and a bitmap decoded from a least significant bit (LSB) portion of the indicator;

and

a discrete encoding that includes a first indicator and a second indicator,

wherein: the encoding format is configured to be selected in response to control bits (an entry having an asserted control bit specifies the termination of the replication for the frame, then the replication process for each VLAN starts from the pointer 750, column 14, lines 37-43);

wherein each of the plurality of entries includes a pointer descriptor which includes a plurality of linked-list pointers corresponding to the plurality of output ports (replication operations using table pointer and index destined to (output) ports on VLAN other than ingress VLAN, column 14, lines 4-6, 13-14; IPMC_PTR is used to index into the IP multicast VLAN ID table which stores VLAN Ids where the bit position in this table is the index with the VLAN ID routed to outgoing VLAN, Replication Flow, page STN-48, lines 1-17).

Wong fails to disclose a number of duplications of the packet for each of the plurality of output ports is controlled by descriptors arranged in a linked-list table indexed by a hashing function; encoding format of the descriptors, and contiguous range encoding that includes a starting indicator and an ending indicator.

But, Tang et al. discloses replication engine performs replication operations using information which includes multicast expansion table (MET) pointer and local target logic (LTL) index (descriptor) where the LTL index enables the replication engine to perform multicast packet replication, rewrites the frames (hashing) and destined to (output) ports on VLAN other than the ingress VLAN, column 14, lines 4-15, where each multicast entry accessed by IP source address, IP destination address and VLAN ID are hashed using a hash algorithm and the LTL index accesses an entry of the forwarding table using the VLAN ID, columns 12, 13, lines 59-67, 1-2; encoding format (replication for the frame, column 14, lines 42-43) of the descriptors, and replication process for each outgoing VLAN starts from the table pointer 750 (starting indicator) until an entry having an asserted control bit (ending indicator) specifies the termination of the replication for the frame, column 14, lines 37-43.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Tang et al.'s claim limitations because this would have allowed the table entry for each outgoing VLAN to include to include an outgoing VLAN ID and index that select the ports of the egress VLAN receiving the frame, column 14, lines 27-31

Again, Wong fails to disclose plurality of output ports, hashing function and continuous range that includes starting/ending indicators.

But, Tang et al. discloses Fig. 2, multicast packet generated and routed to RCVs 204-210 by way of router 250, column 8, lines 64-65; each multicast entry accessed by IP source address, IP destination address and the VLAN ID are hashed using a hash algorithm, column 12, lines 59-62), and replication process for each outgoing VLAN starts from the pointer 750 (starting indicator) until an entry having an asserted control bit (ending indicator) specifies the termination of the replication for the frame, column 14, lines 37-43.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Tang et al.'s plurality of output ports, hashing function and continuous range that includes a starting/ending indicators because this would have allowed the switch to forward the routed multicast packet/frames to the RCVs 206-210 coupled to its ports, column 9, lines 9-11.

Further, Again, Wong fails to disclose plurality of entries include descriptor with pointer to port.

But, Tang et al. discloses plurality of entries each of which is accessed by VLAN ID (pointer) and further includes index field containing port index value, column 9, lines 60-64.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Tang et al.'s plurality of entries include descriptor with pointer to port because this would have allowed the port index to become the which responds with the port select signals indicating which ports to receive the fame, columns 9 and 10, lines 64-67 and 1-2 respectively.

Regarding Claims 2, Wong discloses the packet duplication system, wherein: each of the number of duplications is coupled to a Virtual Local Area Network (VLAN) (IPM packet replication per VLAN, page STN-10, line 8).

Regarding Claims 4, Wong discloses the packet duplication system, wherein: the VLAN pointer descriptors arranged in the linked-list table include at least one shared descriptor (IPMC_PTR is the index in the IP multicast group vector table is also the index in the IP multicast VLAN ID table, Replication Flow, page STN-48, lines 1-3).

Regarding Claim 6, Wong discloses the packet duplication system of claim 5, wherein: each of the plurality of entries (column of 8 entries in the L3 table, ECMP Dest_Ip Search, step 7, page STN-8) corresponds to one of the plurality of output ports (Block Diagram, CPE egress bus, page STN-2).

Regarding Claims 7, Wong discloses the packet duplication system, wherein: the contiguous range encoding includes a starting Virtual Local Area Network (VLAN) indicator (IPMC Replication, VLAN_ID1, step 9, page STN-13) and an ending VLAN indicator (IPMC Replication, VLAN_ID2, step 12, page STN-13).

Regarding Claims 8, Wong discloses the packet duplication system, wherein: the non-contiguous range encoding includes a most significant bit (MSB) portion (IPMC Replication, 64-bit vector for specifying the MS (Most Significant) 6 bits of VLAN_ID, page STN-11, lines 11-12) of a Virtual Local Area Network (VLAN) indicator (IPMC Replication, VLAN_ID, page STN-11) and a bitmap (ECMP Dest_Ip Search, step 7, LPM table get 12-bit L3_table_index with 3-bit count field, page STN-8) decoded from a least significant bit (LSB) portion (ECMP Dest_Ip Search, step 8, index points to the first entry of column of 8-entries in the L3 table, page STN-8) of the VLAN indicator.

Regarding Claims 9, Wong discloses the packet duplication system, wherein: the discrete encoding includes a first Virtual Local Area Network (VLAN) indicator (IPMC Replication, VLAN_ID1, step 9, page STN-13) and a second VLAN indicator (IPMC Replication, VLAN_ID2, step 12, page STN-13).

Regarding claims 21 and 25 Wong discloses a multicast packet duplication system for multicast packets (Internet Protocol Multicast (IPMC) packet duplication covers tables required to

implement the MMU and egress module, page 3, lines 2-4) containing at least multicast address data (multicast packet is replaced with source MAC address, page 3, lines 14-15), comprising:

an input port (Block Diagram, CPI ingress bus, page STN-2) configured to receive a packet (IPMC packet, page 5, line 21);

a pointer table (ECMP Support, LPM table, page STN-7) having a width comprising a plurality of entries (ECMP Support, LPM table, page STN-7; ECMP Dest_Ip, steps 2 and 3, LPM table with ip addresses, page STN-8) coupled to a linked-list table (ECMP Support, L3 table, page STN-7; steps 6 and 7, L3_table_index, index points to entry of 8 entries in the L3 table); and

a plurality of output ports (Block Diagram, CPE egress bus, page STN-2) configured to output the packet; said output ports being coupled to one or more Virtual Local Area Networks (VLAN) (VLAN) (IPM packet replication per VLAN, page STN-10, line 8);

wherein said system applies a hashing function (each multicast entry accessed by IP source address, IP destination address and the VLAN ID are hashed using a hash algorithm, column 12, lines 59-62) to the multicast address data of said multicast packets; and

wherein said system uses the result of said hashing function as an index to a linked- list table (VLAN ID of the packet with IP recalculation and the SA of the packet replaced with IP multicast address where the VLAN ID in the VLAN ID table corresponds to bit position and the bit position is the index into the IP multicast VLAN table, Replication Flow, page STN-48, lines 2-17); said linked-list table having entries that comprise either multicast descriptors (index into the IP multicast VLAN ID table which stores VLAN Ids corresponding to the bit position and the bit position in this table is the index with the VLAN ID table, Replication Flow, page STN-48,

lines 1-5) or pointers (Head_Pointer and the Next_Pointer used as index to the LS table, step 5, STN-13) to multicast descriptors;

said multicast descriptors being comprised of at least multicast VLAN descriptors or pointers (ECMP Dest_Ip Search, step 10, VLAN_tag, page STN-8) to multicast VLAN descriptors;

wherein a number of distributions of said multicast packet and an output port distribution of said multicast packet is controlled by information stored in either the multicast descriptors or multicast VLAN descriptors (replication engine includes the pointer and index where the index (descriptor) enables the replication engine to perform multicast packet replication, further specifies the port with the incoming (ingress) VLAN and rewrites the frame destined to ports on the VLAN (output ports) other than the ingress VLAN, column 14, lines 4-15);

wherein said multicast VLAN descriptors contain a plurality of entries (column of 8 entries in the L3 table, ECMP Dest_Ip Search, step 7, page STN-8) each describing the multicast packet distribution to a different VLAN (VLANs, page 3, lines 6-7); and

wherein an encoding format (replication for the frame, column 14, lines 42-43) said VLAN descriptors include at least one of:

a contiguous range encoding that includes a starting VLAN indicator and an ending VLAN indicator (replication process for each outgoing VLAN starts from the pointer 750 (starting indicator) until an entry having an asserted control bit (ending indicator) specifies the termination of the replication for the frame, column 14, lines 37-43); or

a non-contiguous range encoding that includes a most significant bit (MSB) portion of a VLAN indicator and a bitmap decoded from a least significant bit (LSB) portion of the VLAN indicator; and

a discrete encoding that includes a first VLAN indicator and a second VLAN indicator, wherein: the encoding format is configured to be selected in response to control bits (an entry having an asserted control bit specifies the termination of the replication for the frame, then the replication process for each VLAN starts from the pointer 750, column 14, lines 37-43); wherein each of the plurality of entries of the pointer table includes a pointer descriptor which includes a plurality of linked-list pointers corresponding to the plurality of output ports (IPMC_PTR is used to index into the IP multicast VLAN ID table which stores VLAN Ids where the bit position in this table is the index with the VLAN ID routed to outgoing VLAN, Replication Flow, page STN-48, lines 1-17)

Wong fails to disclose plurality of output ports, hashing function and continuous range that includes starting/ending indicators.

But, Tang et al. discloses Fig. 2, multicast packet generated and routed to RCVs 204-210 by way of router 250, column 8, lines 64-65; each multicast entry accessed by IP source address, IP destination address and the VLAN ID are hashed using a hash algorithm, column 12, lines 59-62), and replication process for each outgoing VLAN starts from the pointer 750 (starting indicator) until an entry having an asserted control bit (ending indicator) specifies the termination of the replication for the frame, column 14, lines 37-43.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Tang et al.'s plurality of output ports, hashing function and continuous range that includes a starting/ending indicators because this would have allowed the

switch to forward the routed multicast packet/frames to the RCVs 206-210 coupled to its ports, column 9, lines 9-11.

Again, Wong fails to disclose plurality of entries include descriptor with pointer to port.

But, Tang et al. discloses plurality of entries each of which is accessed by VLAN ID (pointer) and further includes index field containing port index value, column 9, lines 60-64.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Tang et al.'s plurality of entries include descriptor with pointer to port because this would have allowed the port index to become the which responds with the port select signals indicating which ports to receive the fame, columns 9 and 10, lines 64-67 and 1-2 respectively.

Regarding Claim 23, Wong discloses the packet duplication system of claim 21, wherein said multicast descriptors also include a multicast packet time to live field (packet aging based on packet time stamp, page STN-49, line 16).

Regarding Claim 24, Wong discloses the packet duplication system of claim 21, wherein said multicast Virtual Local Area Network (VLAN) descriptors contain a plurality of entries (column of 8 entries in the L3 table, ECMP Dest_Ip Search, step 7, page STN-8) each describing the multicast packet distribution to a different VLAN (VLANs, page 3, lines 6-7).

Regarding Claim 27, Wong discloses the packet duplication system of claim 1, wherein a first descriptor in the linked-list table includes a first link to a second descriptor in the linked-list table.

Wong fails to disclose first descriptor to second descriptor in the table.

But, Tang et al. discloses Fig. 3, the port index becomes the destination index in the table, column 9, lines 64-65.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Tang et al.'s first descriptor to second descriptor in the table because this would have allowed the port index to become the destination index when there was a hit in the table which responds to the select signals over the switching bus, columns 9 and 10, lines 64-67 and line 1 respectively.

Regarding Claim 28, Wong discloses the packet duplication system of claim 27, wherein the second descriptor in the linked-list table includes a second link to a third descriptor in the linked-list table.

Wong fails to disclose second descriptor to third descriptor in the table.

But, Tang et al. discloses Fig. 3, the destination index is then used to reference an index entry 352 in the table, column 9, lines 65-66.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use Tang et al.'s second descriptor to third descriptor in the table

because this would have allowed the destination index to reference the index entry when there was a hit in the table which responds to the select signals over the switching bus, columns 9 and 10, lines 64-67 and line 1 respectively.

Response to Arguments

2. Applicant's arguments filed January 4, 2010 have been considered as follows:

- In the remarks on pages 9-14 of the amendment, applicant contends that: (1) Tang et al. does not teach or disclose the entries are contiguous encodings of the VLANs. (2) non-contiguous range encoding element. (3) number of duplications of the packet for each of the plurality of output ports in controlled by descriptors or pointers arranged in a linked-list table indexed by a hashing function applied to multicast address data. (4) plurality of entries include a pointer descriptor which includes a plurality of linked-list pointers corresponding to the plurality of output ports. (5) Wong fails to teach or suggest: (6) system uses hashing function as an index to a linked-list table. (7) linked-list table having entries that comprise at least either multicast descriptors or pointers to multicast descriptors.
- The examiner respectfully withdraws the ***Claim Rejections - 35 USC § 101*** due to the applicant's cancellation of these claims, and contends that: Tang et al. discloses: (1) the claim limitation contiguous range encoding that includes a starting indicator and an ending indicator (replication process for each outgoing VLAN sequentially starts from the table pointer 750 (starting

indicator) until an entry having an asserted control bit (ending indicator) specifies the termination of the replication for the frame, column 14, lines 37-43). (2) non-contiguous range encoding was an optional claim limitation. However, it is disclosed in multicast process to encode and transmit information using the content of the message for the multicast flow defined in the packet where components of the packet implement reverse path forwarding, column 5, lines 44-56. (3) number of duplications of the packet for each of the plurality of output ports is controlled by descriptors arranged in a linked-list table indexed by a hashing function (replication engine performs replication operations using information which includes multicast expansion table (MET) pointer and local target logic (LTL) index (descriptor) where the LTL index enables the replication engine to perform multicast packet replication, rewrites the frames (hashing) and destined to (output) ports on VLAN other than the ingress VLAN, column 14, lines 4-15, where each multicast entry accessed by IP source address, IP destination address and VLAN ID are hashed using a hash algorithm and the LTL index accesses an entry of the forwarding table using the VLAN ID, columns 12, 13, lines 59-67, 1-2). (4) plurality of entries includes a pointer descriptor which includes a plurality of linked-list pointers corresponding to the plurality of output ports (replication operations using table pointer and index destined to (output) ports on VLAN other than ingress VLAN, column 14, lines 4-6, 13-14. (5) Wong discloses that: (6) hashing function as an index to a linked-list table (hash

function provides the pointer to the table, paragraph [0039], page 4, lines 10-11). (7) linked-list table having entries that comprise at least either multicast descriptors or pointers to multicast descriptors (ECMP Support, L3 table, page STN-7; steps 6 and 7, L3_table_index, index points to entry of 8 entries in the L3 table).

Conclusion

3. **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Andrews whose telephone number is (571) 270-1801. The examiner can normally be reached on Monday through Friday 7:30 AM to 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rao S. Seema can be reached on (571) 272-3174. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Seema S. Rao/

Supervisory Patent Examiner, Art Unit 2462

LA/la
April 10, 2010